PRELIMINARY

ABX RS232 Interface Protocol

Date: 3/1/00, Rev. 01

Specifications / protocol subject to change without notice.

The ABX Comparator can interface with a PC (personal computer) via the RS232 port (DB-9 connector) on the rear panel, next to the IEC power connector. The data transfer between the ABX and the PC are as described below:

A. RS233 Port Setting:

9600 baud, no parity, 8 data, and 1 stop bit.

B. Key Control Codes:

Key	Key Abbreviation	Code(Hex)	Char(ASCII)	Decimal
A	A	35	5	53
B	B	36	6	54
X	X	37	7	55
Enter	E	3D	=	61
Calibration	C	32	2	50
Trial	T	33	3	51
Scroll	S	3C	<	60
Sleep (PC only)	SL	38	8	56

C. Operating Transfer Codes:

All Operating Transfer Codes from the ABX to the PC have the prefix '8' as a control byte, followed by the key code.

Function	Code(Hex)	Char(ASCII)	Decimal	Note
X_AMP is A	38 35	85	56 53	start Trial test
X_AMP is B	38 36	86	56 54	start Trial test
X_AMP is A	3D 38 35	=85	61 56 53	In Trial Test
X_AMP is B	3D 38 36	=86	61 56 54	In Trial Test

D. User Action Coders:

1. Power Up: Right after it is turned on, the ABX comparator runs a self-diagnostic routine, during which it will usually send a “garbage code” message of “98 52H.” Make sure the PC disregards this data.

a. Using keypad, wired remote, or Infrared remote

Sequence	Key Press	ABX Task	ABX LCD Display	Codes send to PC (Hex)
1	None	Ask for type of test	Select Test Type A=Power, B=Line	None
2	A	Select Power test. ABX starts with Calibration mode	Cal. Unit A, Ch. 1 Then press ENTER	35
3	B	Select Line type. ABX starts with Trial mode. No Calibration mode available	Trial Mode: Test 1 Listening to unit: X	38 35 if X is A 38 36 if X is B
4	X,E,C,T, R,S	Select invalid keys – X, Enter, Cal, Trial, Review, and Scroll. No task is done.	Invalid selection Please try again!	Value of key pressed

b. Using PC to control the ABX

Sequence	PC Control Code (Hex)	ABX Task	ABX LCD Display	ABX return codes to PC (Hex)
1	None	Ask for type of test	Select Test Type A=Power, B=Line	None
2	35	Select Power test. ABX starts with Calibration mode	Cal. Unit A, Ch. 1 Then press ENTER	None
3	36	Select Line mode. ABX starts with Trial mode. No Calibration mode available	Trial Mode: Test 1 Listening to unit: X	38 35 if X is A 38 36 if X is B
4	37,3D, 32,33,34 3C	Select invalid keys – X, Enter, Cal, Trial, Review, and Scroll. No task is done.	Invalid selection please try again!	None

2. Calibration Mode: This mode allows precise matching of gains of power amplifiers under test. If the ABX comparator has a slave unit connected, slave calibration will begin automatically after the main calibration procedure. Line-level testing has no calibration mode.

a. Using keypad, wire remote, or Infrared remote

Sequence	Key Press	ABX Task	ABX LCD Display	Codes send to PC (Hex)
1	C	Switch to Calibration mode and start with Amp 1, channel 1.	Cal. Unit A, Ch. 1 Then press ENTER	32
2	E	Calibrate the next channel in line	Cal. Unit A, Ch. 2 Then press ENTER	3D
3	E	Calibrate the next channel in line	Cal. Unit B, Ch. 1 Then press ENTER	3D
4	E	Calibrate the next channel in line	Cal. Unit B, Ch. 2 Then press ENTER	3D
5	E	Calibrate the next channel in line if slave unit detected	Cal. Slave A, Ch. 1 Then press ENTER	3D
6	E	Calibrate the next channel in line if slave unit detected	Cal. Slave A, Ch. 2 Then press ENTER	3D
7	E	Calibrate the next channel in line if slave unit detected	Cal. Slave B, Ch. 1 Then press ENTER	3D
8	E	Calibrate the next channel in line if slave unit detected	Cal. Slave B, Ch. 2 Then press ENTER	3D
9	E	Finish Cal mode and start Trial mode automatically.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)
10	C	Pressing Calibration key during seq. #2 through #8, no task done – remain in the same position.	No change	32
11	A,B,X,T, R,S	Press any one of these keys during seq. #2 through #8, ABX displays message and return to the previous position.	Please finish Calibration mode!	Value of key pressed

b. Using PC to control the ABX

Sequence	PC Control Code (Hex)	ABX Task	ABX LCD Display	ABX return codes to PC (Hex)
1	32	Switch to calibration mode and start with Amp 1, channel 1.	Cal. Unit A, Ch. 1 Then press ENTER	None
2	3C	Calibrate the next channel in line	Cal. Unit A, Ch. 2 Then press ENTER	None
3	3C	Calibrate the next channel in line	Cal. Unit B, Ch. 1 Then press ENTER	None
4	3C	Calibrate the next channel in line	Cal. Unit B, Ch. 2 Then press ENTER	None
5	3C	Calibrate the next channel in line if slave unit detected	Cal. Slave A, Ch. 1 Then press ENTER	None
6	3C	Calibrate the next channel in line if slave unit detected	Cal. Slave A, Ch. 2 Then press ENTER	None
7	3C	Calibrate the next channel in line if slave unit detected	Cal. Slave B, Ch. 1 Then press ENTER	None
8	3C	Calibrate the next channel in line if slave unit detected	Cal. Slave B, Ch. 2 Then press ENTER	None
9	3C	Finish Cal mode and start Trial mode automatically.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)
10	32	If Calibration selected during seq. #2 through #8, no task done – remain in the same position.	No change	None
11	35,36,37 33,34,3C	Select any one of these control codes during seq. #2 through #8, ABX displays message and return to the previous position.	Please finish Calibration mode!	None

3. Trial Mode for power-level test:

a. Using keypad, wire remote, or Infrared remote

Sequence	Key Press	ABX Task	ABX LCD Display	Codes send to PC (Hex)
1	T	Switch to Trial mode, and start with Test # 1.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)
2	A	Switch speakers to Unit A	Trial Mode: Test # 1 Listening to Unit: A	35
3	X	Switch speakers to Unit X	Trial Mode: Test # 1 Listening to Unit: X	37
4	B	Switch speakers to Unit B	Trial Mode: Test # 1 Listening to Unit: B	36
5	E	Register user's choice (A or B), X value, and advance to the next Trial (25 max.).	Trial Mode: Test # 2 Listening to Unit: X	3D 38 35 (if X is A) 3D 38 36 (if X is B)
6	T	Pressing Trial key during seq. #2 to #4, no task done – remain in the same position.	No change	33
7	E	If ENTER pressed while listening to unit X, ABX displays message and return to the previous position.	Please select unit A or B before enter!	3D
8	C	If Calibration pressed while in trial test, ABX displays message and asks for response.	Do you want Cal. Mode? A=Yes,B=No	32
8a	A	Switch to Calibration mode, and start with Amp 1, channel 1.	Cal. Unit A, Ch. 1 Then press ENTER	None
8b	B	Switch back to Trial mode. No code sent to PC. No changes made in memory	Trial Mode: Test # 1 Listening to Unit: X	None
9	R	If R pressed during seq #2 through #5, ABX displays message	Do you want Review Mode? A=Yes,B=No	34

9a	A	Switch to Review mode, and display test results.	Results: 0 of 2, Or % correct!	None
9b	B	Switch back to Trial mode. No code sent to PC. No changes made in memory	Trial Mode: Test # 1 Listening to Unit: X	None
10	S	Display invalid message, then switch back to current test. No changes	Invalid selection please try again!	3C

b. Using PC to control the ABX

Sequence	PC Control Code (Hex)	ABX Task	ABX LCD Display	ABX return codes to PC (Hex)
1	33	Switch to Trial mode, and start with Test # 1.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)
2	35	Switch speakers to Unit A	Trial Mode: Test # 1 Listening to Unit: A	None
3	37	Switch speakers to Unit X	Trial Mode: Test # 1 Listening to Unit: X	None
4	36	Switch speakers to Unit B	Trial Mode: Test # 1 Listening to Unit: B	None
5	3D	Register user's choice (A or B), X value, and advance to the next Trial (25 max.)	Trial Mode: Test # 2 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)
6	33	Pressing Trial key during seq. #2 through #4, no task done – remain in the same position.	No change	None
7	3D	If ENTER selected while listening to unit X, ABX displays message and return to the previous position.	Please select unit A or B before enter!	None
8	32	If select Calibration while in trial test, ABX displays message and asks response.	Do you want Cal. Mode? A=Yes,B=No	None
8a	35	Switch to Calibration mode, and start with Amp 1, channel 1.	Cal. Unit A, Ch. 1 Then press ENTER	None
8b	36	Switch back to Trial mode. No code sent to PC. No changes made in memory	Trial Mode: Test # 1 Listening to Unit: X	None
9	34	If R selected during seq #2 through #5, ABX displays message	Do you want Review Mode? A=Yes,B=No	None
9a	35	Switch to Review mode, and display test results.	Results: 0 of 2, Or % correct!	None
9b	36	Switch back to Trial mode. No code sent to PC. No changes made in memory	Trial Mode: Test # 1 Listening to Unit: X	None
10	3C	Display invalid message, then switch back to current test. No changes	Invalid selection please try again!	None

4. Trial Mode for line-level test:

a. Using keypad, wire remote, or Infrared remote

Sequence	Key Press	ABX Task	ABX LCD Display	Codes send to PC (Hex)
1	T	Switch to Trial mode, and start with Test # 1.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)
2	A	Switch signal lines to Unit A	Trial Mode: Test # 1 Listening to Unit: A	35
3	X	Switch signal lines to Unit X	Trial Mode: Test # 1 Listening to Unit: X	37
4	B	Switch signal lines to Unit B	Trial Mode: Test # 1 Listening to Unit: B	36
5	E	Register user's choice (A or B), X value, and advance to the next step (25 max.)	Trial Mode: Test # 2 Listening to Unit: X	3D 38 35 (if X is A) 3D 38 36 (if X is B)

6	T	If Trial key pressed during seq. #2 through #4, no task done – remains in the same position.	No change	33
7	E	If ENTER pressed while listening to unit X, ABX displays message and return to the previous position.	Please select unit A or B before enter!	3D
8	C	Display message on LCD and return to previous position.	Not available for Line level testing!	32
9	R	If R pressed during seq #2 through #5, ABX displays message	Do you want Review Mode? A=Yes,B=No	34
9a	A	Switch to Review mode, and display test results.	Results: 0 of 2, Or % correct!	None
9b	B	Switch back to Trial mode. No code sent to PC. No changes made in memory	Trial Mode: Test # 1 Listening to Unit: X	None
10	S	Display invalid message, then switch back to current test. No changes	Invalid selection please try again!	3C

b. Using PC to control the ABX

Sequence	PC Control Code (Hex)	ABX Task	ABX LCD Display	ABX return codes to PC
1	33	Switch to Trial mode, and start with Test # 1.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)
2	35	Switch signal lines to Unit A	Trial Mode: Test # 1 Listening to Unit: A	None
3	37	Switch signal lines to Unit X	Trial Mode: Test # 1 Listening to Unit: X	None
4	36	Switch signal lines to Unit B	Trial Mode: Test # 1 Listening to Unit: B	None
5	3D	Register user's choice (A or B), X value, and advance to the next Trial (25 max.)	Trial Mode: Test # 2 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)
6	33	If Trial key pressed during seq. #2 through #4, no task done – remain in the same position.	No change	None
7	3D	If ENTER selected while listening to unit X, ABX displays message and return to the previous position.	Please select unit A or B before enter!	None
8	32	Display message on LCD and return to previous position.	Not available for Line level testing!	None
9	34	If select R during seq #2 through #5, ABX displays message	Do you want Review Mode? A=Yes,B=No	None
9a	35	Switch to Review mode, and display test results.	Results: 0 of 2, Or % correct!	None
9b	36	Switch back to Trial mode. No code sent to PC. No changes made in memory	Trial Mode: Test # 1 Listening to Unit: X	None
10	3C	Display invalid message, then switch back to current test. No changes	Invalid selection please try again!	None

5. Review Mode for power-level test:

a. Using keypad, wire remote, or infrared remote

Sequence	Key Press	ABX Task	ABX LCD Display	Codes send to PC (Hex)
1	E	Switch to Review mode after completing 25 trials and display test results.	Results: 13 of 25, Or 52% correct!	3D
2	S	Display First Trial test result	Trial # 1, "X" =A You chose: B	3C
2a	S	Scroll up Trial test data by 1, and then display test data.	Trial # 1, "X" =A You chose: B	3C
4	A,B,X,E	Display invalid message, then switch back to current display. No changes	Invalid selection please try again!	Value of key pressed
5	C	Switch to Calibration mode, and start with Amp 1, channel 1.	Cal. Unit A, Ch. 1 Then press ENTER	32
6	T	Switch to Trial mode, and start with Test # 1.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)
6a	R	Display message and pause	No test data Available!	34
6b	A,B,X,E, S	Display invalid message and return to no data message	Invalid selection please try again!	Value of key pressed
6c	R	No task done – remain in the same position.	No test data Available!	34
6d	C	Switch to Calibration mode, and start with Amp 1, channel 1.	Cal. Unit A, Ch. 1 Then press ENTER	32
6e	T	Switch to Trial mode, and start with Test # 1.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)

b. Using PC to control the ABX

Sequence	PC Control Code (Hex)	ABX Task	ABX LCD Display	ABX return codes to PC (Hex)
1	3D	Switch to Review mode after completing 25 trials and display test results.	Results: 13 of 25, Or 52% correct!	None
2	3C	Display First Trial test result	Trial # 1, "X" =A You chose: B	None
2a	3C	Scroll up Trial test data by 1, and then display test data.	Trial # 1, "X" =A You chose: B	None
4	35,36,37, 3D	Display invalid message, then switch back to current display. No changes	Invalid selection please try again!	None
5	32	Switch to Calibration mode, and start with Amp 1, channel 1.	Cal. Unit A, Ch. 1 Then press ENTER	None
6	33	Switch to Trial mode, and start with Test # 1.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)
6a	34	Display message and pause	No test data Available!	None
6b	35,36,37, 3D, 3C	Display invalid message and return to no data message	Invalid selection please try again!	None
6c	34	No task done – remain in the same position.	No test data Available!	None
6d	32	Switch to Calibration mode, and start with Amp 1, channel 1.	Cal. Unit A, Ch. 1 Then press ENTER	None
6e	33	Switch to Trial mode, and start with Test # 1.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)

6. Review Mode for line-level test:

a. Using keypad, wire remote, or Infrared remote

Sequence	Key Press	ABX Task	ABX LCD Display	Codes send to PC (Hex)
1	E	Switch to Review mode after completing 25 trials and display test results.	Results: 13 of 25, Or 52% correct!	3D
2	S	Display First Trial test result	Trial # 1, "X" =A You chose: B	3C
2a	S	Scroll up Trial test data by 1, and then display test data.	Trial # 1, "X" =A You chose: B	3C
4	A,B,X,E	Display invalid message, then switch back to current display. No changes	Invalid selection please try again!	Value of key pressed
5	C	Display message on LCD and return to previous position.	Not available for Line level testing!	32
6	T	Switch to Trial mode, and start with Test # 1.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)
6a	R	Display message and pause	No test data Available!	34
6b	A,B,X,E, S	Display invalid message and return to no data message	Invalid selection please try again!	Value of key pressed
6c	R	No task done – remain in the same position.	No test data Available!	34
6d	C	Display message on LCD and return to previous position.	Not available for Line level testing!	32
6e	T	Switch to Trial mode, and start with Test # 1.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)

b. Using PC to control the ABX

Sequence	PC Control Code (Hex)	ABX Task	ABX LCD Display	ABX return codes to PC (Hex)
1	3D	Switch to Review mode after completing 25 trials and display test results.	Results: 13 of 25, Or 52% correct!	None
2	3C	Display First Trial test result	Trial # 1, "X" =A You chose: B	None
2a	3C	Scroll up Trial test data by 1, and then display test data.	Trial # 1, "X" =A You chose: B	None
4	35,36,37, 3D	Display invalid message, then switch back to current display. No changes	Invalid selection please try again!	None
5	32	Display message on LCD and return to previous position.	Not available for Line level testing!	None
6	33	Switch to Trial mode, and start with Test # 1.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)
6a	34	Display message and pause	No test data Available!	None
6b	35,36,37, 3D, 3C	Display invalid message and return to no data message	Invalid selection please try again!	None
6c	34	No task done – remain in the same position.	No test data Available!	None
6d	32	Display message on LCD and return to previous position.	Not available for Line level testing!	None
6e	33	Switch to Trial mode, and start with Test # 1.	Trial Mode: Test # 1 Listening to Unit: X	38 35 (if X is A) 38 36 (if X is B)

7. Sleep Mode: (Default setting: 60 minutes)

After 60 minutes with no activity, the ABX comparator will go into sleep mode, turning off its LCD display and relays. It will remain asleep until its controls are actuated. However, the sleep delay time can be reprogrammed to any whole-minute interval from 1 minute to 120 minutes.

Sequence	PC Control Code (Hex)	ABX Task	ABX LCD Display	ABX return codes to PC (Hex)
1	38	Adjust sleep delay; range from 1 minute to 120 minutes.	No change	None
2	"sleep delay" value	Set the sleep delay interval to a new value.	None	None